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Hellenic and the Italic, but of the Iranian and the Indian civilizations.

(7) Finally, if the Hellenic civilization and mythology is thus to be mainly derived from a pre-existing Oriental or "Pelasgian" civilization, it is either from such pre-existing civilizations, or from Aryans such as the Kelto-Italiots, migrating northward and southward from Pelasgian Thrace, that the civilization of Western and Northern Europe would, on this hypothesis, be traced; and a vast number of facts appear to make it more probable that the earlier civilization of Northern Europe was derived from the south than that the earlier civilization of Southern Europe was derived from the north.

The three conditions of a true solution of the problem either of Semitic or of Aryan origins appear to be these: First, the locality must be one in which such a new race could have ethnologically, and secondly philologically, arisen as a variety of the Archean stock of white races; and thirdly, it must be such as to make easily possible the historical facts of dispersion and early civilization. And I venture to submit the above set of facts as not inadequately, perhaps, supporting the South Russian "speculation as to the origin and home of the Aryan family."—J. S. STUART GLENNIE, in *Nature*, October 2d, 1890.

MICROSCOPY.[1]

Lumbricus, Egg-Laying, etc.[2]—In spite of many individual variations, the egg-capsules of the various species of *Lumbricus* are, as a rule, readily distinguishable in form, color, and size. Those of *L. fœtidus*, which are laid in and about manure-heaps, are rather regularly fusiform, varying in color from light yellowish to dark brownish olive; they measure on the average about 4–6 by 2–3 millimeters. The albumen is tough and jelly-like, dissolves with difficulty in water, and becomes of a horn-like consistency after the hardening action of reagents. Each capsule contains from ten to sixty ova, of which not more than ten or twelve undergo development, and this number may be reduced to one or two, particularly in the winter season. The capsules of *L. communis* and *L. terrestris* are

[1] Edited by C. O. Whitman, Clark University, Worcester, Mass.

[2] E. B. Wilson. *Journ. Morphology*, III., 3, Dec. 1889.

deposited in earth, usually a few inches below the surface. Those of the first species are irregularly fusiform, and of a brighter yellow color than those of *L. fœtidus;* they measure on the average about 5–7 by 3–5 millimeters. Those of *L. terrestris* are still larger (mean measurements are 6–8 by 4–6 mm.), regularly fusiform, but more swollen and rounded than those of the other species; their color is a dark olive. In both species the albumen has a slimy, mucus-like consistency, and is not greatly hardened by reagents. In *L. terrestris* only one egg develops out of several included in the capsule. *In L. communis two embryos are produced as a rule, and in many cases, though not in all, both arise as twins from a single ovum, as has been described by Kleinenberg.*

Egg-laying seems in special cases to continue throughout the year, though it is most active in the spring and summer months. I have found the capsules of *L. fœtidus* out of doors in nearly every month of the year, but in mid-winter they are only found in decomposing compost heaps where the temperature is maintained at a tolerably high point. The rate of development varies greatly, and depends not only upon the temperature, but also upon the vigor or other internal properties of the individual embryos, for in late stages the embryos in a single capsule are often found in very different stages of advancement. It is therefore impossible to determine the age of the embryo without following its actual development. In laboratory cultures the young worms usually make their escape from the capsule in about two or three weeks.

Development continues for some time after removal of the segmenting ova from the capsule, but pathological changes invariably supervene, however careful the treatment, and I am persuaded that no trustworthy results can be obtained by this method. After making numerous drawings of embryos thus studied, I rejected them all, and relied wholly on the comparative study of specimens examined or preserved immediately after opening the capsules. The results thus obtained, though based on the examination of a very large number of specimens, are necessarily incomplete; but I believe them to be trustworthy as far as they go.

As in so many other cases, periods of quiescence, or "resting stages," alternate with periods of division throughout the cleavage process. In the resting periods the cells are closely pressed together, and their outlines are often hard to see; so that it is well-nigh impossible to interpret some of the stages unless they are studied in the active period. Moreover, the cleavage process varies greatly in the

order of division, which after the first two divisions loses all appearance of regularity. On account of these circumstances the segmenting ova vary widely in appearance, and the process of cleavage thus acquires that apparent irregularity which other observers have found so perplexing. It is now well known, however, that the segmenting ova of various other animals (*e.g.*, Mollusca, Cœlenterata) are likewise subject to considerable variation, which in some cases at any rate is due simply to temporary acceleration or retardation in the divisions of individual cells (No. 53), and probably does not affect the essential character or the end-result of the cleavage.

Preparation of the Embryos of Lumbricus.[3]—The demonstration of the teloblasts of the germ-bands may be effected in the following manner: Take embryos from .5 to .8 mm. long, place them in fresh filtered lemon juice 5 minutes, and then 20 minutes in 1% gold chloride; and then, for reduction, in a mixture of one part formic acid and four parts water (in daylight). After one or two hours the embryos become reddened and quite soft. They are then to be placed on a slide, the dorsal body-wall torn off, and the isolated ventral wall so placed that its outer surface faces upward. Examined in water, the teloblasts and cell-rows are seen with great distinctness.

For finer purposes the foregoing method is not to be used. It is better to use Flemming's chrom-osmiuo-acetic acid. The embryos remain in this a few minutes, and are then removed to a ⅓% solution of platinum chloride for twice or three times as long. After such treatment surface preparations are best examined in glycerine. Preparations for sections are stained in aqueous hæmotoxylin.

For demonstrating the median ventral plexus of nerve cells, the treatment with lemon juice and gold chloride is followed, except that the reduction is effected in very dilute acetic instead of formic acid (in daylight). After two days (in winter) the embryos are violet colored, and may then be hardened in alcohol (in the dark), and prepared for the microtome in the usual way. In quite young embryos, the epidermis, neural plates, and muscle plates appear clear, and only the nerve cells are stained dark violet.

[3] R. S. Bergh. *Zeitschr. f. wiss. Zool.*, L., 3, Sept. 1890, pp. 474-5 and 484.